AEROMMA:

Atmospheric Emissions and Reactions Observed from Megacities to Marine Areas

Feb 2020

*A comprehensive study led by **NOAA's Chemical Sciences Laboratory** investigating anthropogenic and marine emissions that alter tropospheric composition and impact air quality and climate*

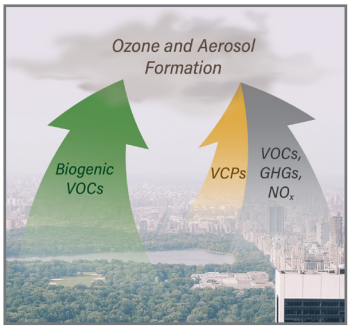
The AEROMMA project addresses emerging research needs in urban air quality, marine chemistry influences on cloud formation, and interactions at the marine-urban interface

NOAA research has identified an emerging source of volatile organic compounds to the urban atmosphere that contributes to ozone and aerosol

More than 100 million Americans live in non-attainment areas for ground-level ozone.

Tropospheric ozone is a toxic air pollutant formed through reactions involving VOCs and NO_x.

Volatile chemical products (VCPs) are emerging as a major urban source of petrochemical organics *[McDonald et al., Science, 2018]*.

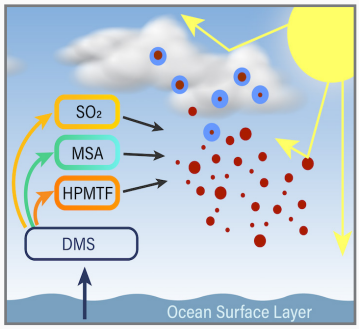


VOCs = volatile organic compounds
GHGs = greenhouse gases

A recent NOAA discovery has redefined the marine sulfur cycle, prompting a renewed look at air-sea exchange

Oxidation of ocean-emitted dimethyl sulfide (DMS) produces sulfate aerosol, which in turn impacts albedo, cloud formation, and climate.

CSD's discovery of an additional DMS oxidation product (HPMTF) shows that the marine sulfur cycle in current models is incomplete *[Veres et al., PNAS, 2020]*.

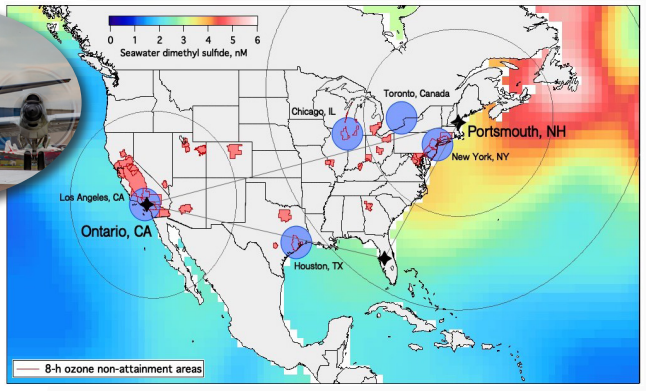


MSA = methane sulfonic acid
HPMTF = hydroperoxymethyl thioformate

AEROMMA will expand upon these new findings to assess their impacts on air quality and climate and improve our understanding of air pollution in a changing environment

Anticipated outcomes:

- Provision of timely information to environmental managers and stakeholder groups on emissions from VCPs and fossil fuel sources that impact climate and air quality.
- Reduction of uncertainties in global climate models due to marine aerosols from biogenic sulfur emissions.
- Provision of urban and marine datasets to improve the representation of emissions and chemical and physical processes in the next generation NOAA weather-chemistry models.



AEROMMA will use an extensively instrumented NOAA P-3 research aircraft through a series of flights in May - July 2021. The aircraft will base in California and New England to access several major coastal and inland cities and two ocean basins. The P-3 flight range is indicated as rings on the above map.

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